

REF BA

(54) ROOF RACK

(71) PLASTCO (AUSTRALIA) PTY. LIMITED

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(51)<sup>4</sup> B60R 9/04

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(57) Claim

1. A motor vehicle roof rack of the type having a frame supported by at least four pillars, each pillar having a foot adapted to be supported directly or indirectly by the roof of the vehicle, wherein one or more joints are provided in association with each pillar allowing inclination of the pillar relative to the frame in both lateral and longitudinal directions.



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# COMPLETE SPECIFICATION

(ORIGINAL)

FOR OFFICE USE

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## TO BE COMPLETED BY APPLICANT

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Complete Specification for the invention entitled: "Motor Vehicle Roof Rack"

The following statement is a full description of this invention, including the best method of performing it known to me:—

\* Note: The description is to be typed in double spacing, pica type face, in an area not exceeding 250 mm in depth and 160 mm in width, on tough white paper of good quality and it is to be inserted inside this form.

This invention relates to a motor vehicle roof rack and has been devised particularly though not solely to enable roof racks to be easily and securely fastened to the roofs of motor vehicles.

5 Throughout this specification where reference is made to the roof of a motor vehicle, it will be appreciated that the "roof" rack can also be affixed to other surfaces on a motor vehicle such as a boot lid. Although the term "roof" rack is used it should not be interpreted as  
10 limiting the use of this type of rack to the roofs of motor vehicles.

In the past various types of roof racks have been proposed for use on motor vehicles and one popular type of roof rack incorporates a rectangular perimeter frame  
15 having two longitudinal rails and two lateral rails at either end mounted above the roof by four pillars at or adjacent the corners which are screwed or bolted to the roof of the vehicle. Such racks have the disadvantage that it is necessary to drill holes in the roof of the  
20 vehicle for securing the fasteners which can lead to problems due to weakening of the roof or water penetration. The fasteners also provide point loadings from the roof rack to the roof of the vehicle which can result in distortion of the roof and possible tearing of  
25 the mountings from the roof under severe loading.

The applicants have considered the possibility of using a suitable glue or adhesive to mount the pillars to the roof of the vehicle but have realised that for such a method of mounting to be successful the foot of each  
30 pillar must be able to sit perfectly flatly on the roof of the vehicle. This causes difficulties on many roofs of motor vehicles which are cambered not only in a lateral direction but also in a longitudinal direction.

It is therefore an object of the present invention to  
35 provide a motor vehicle roof rack which will obviate or minimise the foregoing disadvantages in a simple yet effective manner, or which will at least provide the

public with a useful choice.

Accordingly the invention consists in a motor vehicle roof rack of the type having a frame supported by at least four pillars, each pillar having a foot adapted to be supported directly or indirectly by the roof of the vehicle, wherein one or more joints are provided in association with each pillar allowing inclination of the pillar relative to the frame in both lateral and longitudinal directions.

10 Preferably the frame comprises a rectangular perimeter frame having two longitudinal and two lateral rails supported by said pillars at each corner.

Preferably the foot of each pillar is adapted to be fastened directly or indirectly to the roof of a vehicle by a suitable glue or adhesive.

15 Preferably a pair of longitudinal bars are provided located beneath the longitudinal rails, the foot of each pillar being secured to the adjacent bar, and the bars being adapted to be fastened to the roof of a vehicle by way of double-sided adhesive tape.

20 Preferably the joints provided in association with each pillar are incorporated in a connector at each corner of the perimeter frame, each connector connecting the ends of adjacent longitudinal and lateral rails and providing an attachment for the corresponding pillar.

25 Preferably said connector incorporates a first horizontal pivot having a lateral axis permitting the pillar to incline relative to the frame in a longitudinal plane, and a second horizontal pivot having a longitudinal axis permitting the pillar to incline relative to the frame in a lateral plane.

30 Preferably each connector comprises first and second parts interconnected by the first pivot, the first part being engaged with one end of a longitudinal rail and the second part being pivotally engaged with the pillar by way of the second pivot.

Preferably the second part is engaged with one end of

a lateral rail.

Preferably each pillar is shaped to form a visual continuation of the longitudinal rail.

Notwithstanding any other forms that may fall within  
5 its scope, one preferred form of the invention will now be described by way of example only with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a motor vehicle on which is mounted a roof rack according to the invention;

10 Fig. 2 is a plan view of one of the pillars used in the roof rack according to the invention engaged with a connector providing mounting points for longitudinal and lateral rails;

Fig. 3 is an end elevation of the construction shown  
15 in Fig. 2;

Fig. 4 is a side elevation of the construction shown in Fig. 2;

Fig. 5 is an exploded perspective view of one corner of the roof rack according to the invention;

20 Fig. 6 is a further exploded perspective view from the opposite side of the pillar and connector to that shown in Fig. 5; and

Fig. 7 is an exploded perspective view similar to Fig. 6 showing the connector assembled and aligned for  
25 engagement with the pillar and the corresponding lateral and longitudinal rails.

In the preferred form of the invention a roof rack suitable for use with a motor vehicle is constructed as follows.

30 The roof rack 1 is normally mounted on the roof 2 of a motor vehicle 3 such as that typically shown in Fig. 1, although in alternative forms of the invention the roof rack may be to other sizes and configurations and may, for example, be mounted on the boot or other substantially  
35 horizontal surfaces of a motor vehicle. The roof rack incorporates a generally rectangular perimeter frame formed from two longitudinal rails 4 along either side of

the roof rack and two lateral rails 5 at either end of the roof rack. The perimeter frame is supported by four pillars 7 located at the corners of the roof rack and which are in turn supported directly or indirectly by the roof 2 of the motor vehicle 3. In the preferred form of the invention the pillars are mounted on and secured to longitudinal bars 8 located beneath the longitudinal rails 4, the bars being secured to the roof of the motor vehicle by way of a suitable glue or adhesive. In the preferred form of the invention the bars, which are flexible so as to follow the camber of the roof of the vehicle are secured to the roof by way of double-sided adhesive tape. Further longitudinal bars 9 may also be provided secured to the roof of the vehicle by a suitable glue or adhesive so as to distribute the load carried by the roof rack and to prevent damage to the roof of the vehicle.

It is an important feature of the invention that each pillar 7 is provided with one or more joints allowing inclination of the pillar relative to the frame in both lateral and longitudinal directions. It will be appreciated that the roofs of many motor vehicles are cambered both transversely and longitudinally and that the bars 8 which are glued to the roof of the vehicle will be inclined in both lateral and longitudinal directions at the points where the pillars 7 are secured. Unless the pillars are provided with joints allowing inclination of the pillar relative to the frame in both lateral and longitudinal directions, the bending of the bar 8 to follow the contour of the roof is inhibited resulting in an imperfect and unsatisfactory glue joint between the bar and the roof. Although the joint between the pillar and the perimeter frame may be provided in many different forms, such as a ball and socket joint either incorporated in the pillar or between the pillar and the frame, the preferred form of joint will now be described with reference to Figs. 2 to 7.

As can be most clearly seen from Fig. 5, each pillar

7 has a foot 10 adapted to take the load from the perimeter frame and transmit that load to the roof of the vehicle, and is shaped so as to form a visual continuation at the upper end of the longitudinal rail 4. The foot 10  
5 may be secured directly to the roof of the vehicle, e.g. by gluing, but in the preferred form of the invention the foot is fastened to a flexible bar 8 (Figs. 3 and 4) by way of suitable fasteners such as screws 11 engaged with nuts 12 recessed into the lower surface of the bar 8. The  
10 bar is in turn secured to the roof 2 of the vehicle by way of double-sided adhesive tape 13.

The pillar supports, and is connected to, the longitudinal and lateral rails 4 and 5 respectively by way of a connector 14 comprising a first part 15 and a second  
15 part 16. The first part 15 incorporates a spigot 17 adapted to be inserted into the end of the tubular longitudinal rail 4 and the second part 16 similarly incorporates a spigot 18 adapted to be inserted into the end of the lateral rail 5. The lateral rail may typically  
20 have an aerofoil cross-section as may be seen in Fig. 5 and the spigot 18 has a corresponding cross-section. The respective spigots may be provided with flanges or shoulders 19 to control the depth of penetration of the spigot into the respective rail.

25 The first and second parts of the connector are interconnected by a first pivot 20 comprising a laterally orientated horizontal pin protruding from the first part 15 into a corresponding hole 22 in the second part, allowing the second part to rotate in a longitudinal  
30 vertical plane relative to the first part 15. The pin 21 may be retained within the hole 22 by way of a nib 23 which passes through a slot 24 in the hole 22 before rotation through  $90^{\circ}$  to retain the pin within the hole.

The second part 16 is provided with a pivot pin 25  
35 having a horizontal longitudinally orientated axis which is aligned with the axis of the spigot 17. The pivot pin 25 is engageable in a longitudinal aperture 26 in the

upper end of the pillar 7 which is typically cut-away at 27 (Fig. 6) to allow close coupling of the longitudinal rail 4 with the pillar 7 as will be described below.

In use the connector is assembled in the manner indicated in Fig. 6 to reach the assembled configuration shown in Fig. 7, the spigot 17 engaged with the end of the longitudinal rail 4 and the spigot 18 engaged with the end of the lateral rail 5. The spigots may typically be retained within the tubular rails by way of a suitable glue or adhesive. Four such connectors are inserted at the four corners of the perimeter frame to hold and support the longitudinal and lateral rails in the desired orientation. The pillars 7 are then engaged with the connectors by inserting the pivot pins 25 into the apertures 26 and the pillars are secured to the bars 8 by way of the screws and nuts 11 and 12.

With the roof rack assembled in this manner the mounting bars 8 may be tilted in a lateral direction to accommodate lateral camber in the roof of the vehicle by the pivoting of the pillars 7 about the pivot pins 25. The mounting bars 8 may also be bent in a longitudinal direction to accommodate longitudinal camber in the roof of the vehicle, causing the pillars to tilt in a longitudinal direction. This tilting motion is accommodated by relative movement of the first part 16 of the connector relative to the second part 15 by way of the pivot pin 21.

In this manner a motor vehicle roof rack is provided in which the pillars may tilt in both lateral and longitudinal directions enabling the feet of the pillars to be placed flatly upon the roof of the vehicle or intermediate supporting member such as the bar 8, allowing a satisfactory glue joint to be made between either the foot of the pillar or the bar on which the foot is mounted in the roof of the motor vehicle. Such a glue joint has many advantages, being particularly strong and able to resist tearing loads, and also distributing those loads



over a large area of the roof of the vehicle inhibiting deformation of the roof under severe loading.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A motor vehicle roof rack of the type having a frame supported by at least four pillars, each pillar having a foot adapted to be supported directly or indirectly by the roof of the vehicle, wherein one or more joints are provided in association with each pillar allowing inclination of the pillar relative to the frame in both lateral and longitudinal directions.

2. A motor vehicle roof rack as claimed in claim 1, wherein the frame comprises a rectangular perimeter frame having two longitudinal and two lateral rails supported by said pillars at each corner.

3. A motor vehicle roof rack as claimed in either claim 1 or claim 2, wherein the foot of each pillar is adapted to be fastened directly or indirectly to the roof of a vehicle by a suitable glue or adhesive.

4. A motor vehicle roof rack as claimed in any one of claims 1 to 3, wherein a pair of longitudinal bars are provided located beneath the longitudinal rails, the foot of each pillar being secured to the adjacent bar, and the bars being adapted to be fastened to the roof of a vehicle by way of double sided adhesive tape.

5. A motor vehicle roof rack as claimed in any one of claims 2 to 4, wherein the joints provided in association with each pillar are incorporated in a connector at each corner of the perimeter frame, each connector connecting the ends of adjacent longitudinal and lateral rails and providing an attachment for the corresponding pillar.

6. A motor vehicle roof rack as claimed in claim 5, wherein said connector incorporates a first horizontal pivot having a lateral axis permitting the pillar to incline relative to the frame in a longitudinal plane, and a second horizontal pivot having a longitudinal axis permitting the pillar to incline relative to the frame in a lateral plane.

7. A motor vehicle roof rack as claimed in claim 6,

wherein each connector comprises first and second parts interconnected by the first pivot, the first part being engaged with one end of a longitudinal rail and the second part being pivotally engaged with the pillar by way of the second pivot.

8. A motor vehicle roof rack as claimed in claim 7, wherein the second part is engaged with one end of a lateral rail.

9. A motor vehicle roof rack as claimed in any one of claims 2 to 8, wherein each pillar is shaped to form a visual continuation of the longitudinal rail.

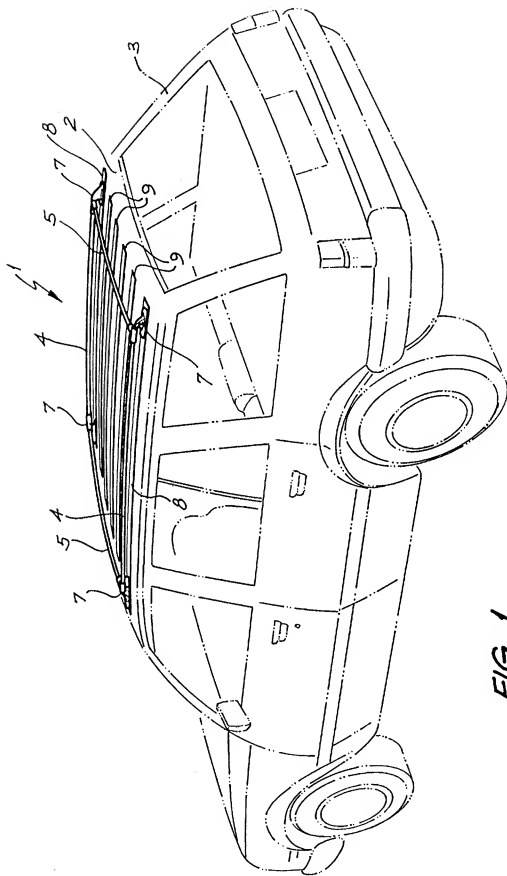
10. A motor vehicle roof rack when constructed and arranged substantially as described herein with reference to the accompanying drawings.

DATED this FOURTH day of SEPTEMBER 1985

~~PLASTCO (AUSTRALIA) PTY. LIMITED~~  
~~MHG INVESTMENTS Pty. Limited.~~  
By their Patent Attorneys  
GRIFFITH HASSEL & FRAZER



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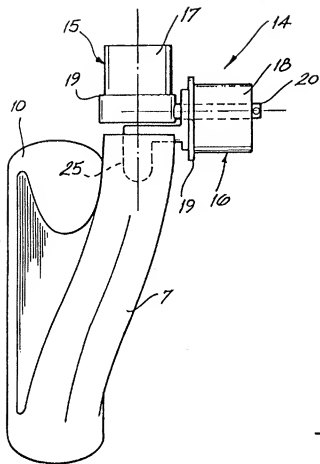


FIG. 2

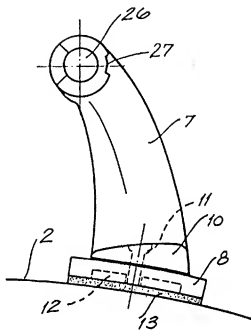


FIG. 3

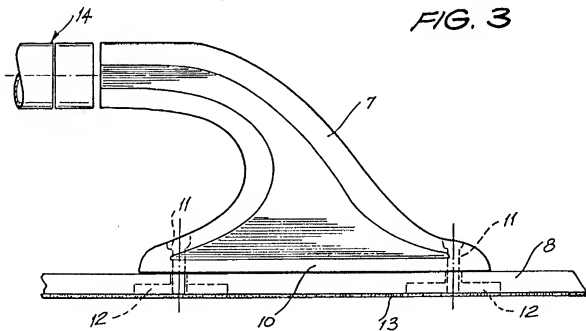


FIG. 4

